IN THE CLAIMS

The following claim listing replaces all prior listings and versions thereof:

1. (Original) A guide mechanism for a lens barrel, the mechanism comprising:

a support frame supporting an imaging component; and

a linear guide configured to guide the support frame along an axis;

wherein the linear guide comprises a ring portion defining an opening through which the support frame can pass, and further comprises at least one linear guide key extending along the axis from the ring portion and positioned substantially radially inwardly of the opening; and

wherein the support frame has at least one linear guide groove located at the outer peripheral surface thereof and configured to slidably engage with a respective said at least one linear guide key, and each of the opposite ends of the at least one linear guide groove are open such that the support frame is movable to extend from either of the sides of the ring portion.

2. (Original) The guide mechanism according to claim 1, wherein said at least one linear guide key extends along the axis on one side of the ring portion only.

3. (Original) The guide mechanism according to claim 1, wherein said at least one linear guide key extends generally perpendicularly from the ring portion.

4. (Original) The guide mechanism according to claim 1, wherein the linear guide has a plurality of linear guide keys provided at different circumferential positions of the ring portion, and wherein the support frame has a corresponding plurality of linear guide grooves.

5. (Original) The guide mechanism according to claim 1, wherein the linear guide key is

substantially planar and is provided substantially perpendicular to a radius of said ring portion.

6. (Original) The guide mechanism according to claim 1, wherein the ring portion has at least one guide projection projecting radially outwardly therefrom and configured to engage a linear guide ring.

7. (Original) The guide mechanism according to claim 6, further comprising a linear guide ring having at least one guide portion, formed on an inner peripheral surface thereof, engageable with said guide projection and configured to guide the linear guide along said axis without rotating.

8. (Original) The guide mechanism according to claim 1, further comprising a cam ring rotatable about said axis, the cam ring having at least one cam groove located on an inner peripheral surface thereof;

wherein the support frame includes at least one cam follower which projects from an outer peripheral surface thereof engageable with said cam groove.

9. (Original) The guide mechanism according to claim 8, wherein said cam ring has a plurality of cam grooves located at different positions on said inner peripheral surface thereof in at least said axis direction to respectively trace a plurality of reference cam diagrams having generally the same shape and size, respectively;

wherein a rearmost cam groove of said plurality of cam grooves in said axis direction is located such that a rear portion of said rearmost cam groove is missing and forms at least one rear end opening of said rearmost cam groove at said rear end of said cam ring;

wherein said support frame has a plurality of cam followers which are located at different positions on said outer peripheral surface thereof in at least said axis direction, said plurality of

cam followers respectively engageable in said plurality of cam grooves;

wherein a rearmost cam follower of said plurality of cam followers is movable out of said rear end opening to be disengaged from said rearmost cam groove when said support frame is positioned at a rear movement limit thereof; and

wherein said ring portion includes at least one cam follower passage recess, which is formed on an inner peripheral surface thereof, and allows said plurality of cam followers to pass through said cam follower passage recess in said axis direction, when said plurality of cam followers are disengaged from said rearmost cam groove.

10. (Original) The guide mechanism according to claim 8, wherein the ring portion is supported by a circumferential portion of said cam ring such that the cam ring is rotatable relative to said ring portion and immovable relative to said ring portion in said axis direction.

11. (Original) A drive mechanism of a lens barrel comprising:

a cam ring rotatable about a rotational axis, including at least one cam groove located on an inner peripheral surface of said cam ring;

a movable frame including at least one cam follower which projects from an outer peripheral surface of said movable frame and is configured to engage in said at least one cam groove; and

a linear guide configured to guide said movable frame linearly in an optical axis direction without rotating said movable frame, said movable frame moving linearly in said optical axis direction by a rotation of said cam ring,

wherein said movable frame comprises at least one linear guide groove located on an outer peripheral surface of said movable frame to extend generally parallel to said optical axis,

each of opposite ends of said linear guide groove being open, and

wherein said linear guide comprises:

a ring portion which includes a central opening through which said movable frame can pass; and

at least one linear guide key which projects from said ring portion and is positioned radially inside said central opening and is further slidably engageable in said at least one linear guide groove,

wherein at least part of said movable frame is positioned in front of said ring portion of said linear guide when said movable frame is positioned at a front movement limit thereof, and

wherein said at least part of said movable frame is configured to pass through said central opening of said ring portion to be positioned behind said ring portion of said linear guide when said movable frame moves to a rear movement limit thereof from said front movement limit.

12. (Original) The drive mechanism according to claim 11, wherein said cam ring comprises a circumferential groove located proximate a rear end of said cam ring in said optical axis direction, such that said ring portion is engageable in said circumferential groove so as not to move in said optical axis direction relative to said cam ring while allowing said cam ring to rotate relative to said ring portion;

wherein said at least one linear guide key extends forward along an inner peripheral surface of said cam ring;

wherein the entire said movable frame is positioned in front of said ring portion of said linear guide when said movable frame is positioned at said front movement limit thereof; and

wherein a portion of said movable frame projects rearward through said central opening of said ring portion and is positioned behind said ring portion of said linear guide when said movable frame is positioned at said rear movement limit thereof.

13. (Original) The drive mechanism according to claim 11, wherein said at least one cam groove comprises a plurality of cam grooves located at different positions on said inner peripheral surface of said cam ring in at least said optical axis direction, said plurality of cam grooves configured to trace a respective plurality of reference cam diagrams having generally the same shape and size, respectively;

wherein a rearmost cam groove of said plurality of cam grooves in said optical axis direction is configured such that a rear portion of said rearmost cam groove is missing and forms at least one rear end opening of said rearmost cam groove at said rear end of said cam ring;

wherein said at least one cam follower includes a plurality of cam followers located at different positions on said outer peripheral surface of said movable frame in at least said optical axis direction, said plurality of cam followers engageable in a respective said plurality of cam grooves;

wherein a rearmost cam follower of said plurality of cam followers exits said rear end opening and is disengaged from said rearmost cam groove when said movable frame is positioned at said rear movement limit thereof; and

wherein said ring portion of said linear guide includes at least one cam follower passage recess located on an inner peripheral surface of said ring portion and allows said plurality of cam followers to pass said ring portion through said cam follower passage recess in said optical axis direction, when said plurality of cam followers are disengaged from said plurality of cam

grooves through said least one rear end opening.

14. (Original) The drive mechanism according to claim 11, wherein a rear end of said at least one linear guide key projects rearward from said at least one linear guide groove when said movable frame is positioned at said front movement limit thereof, and

wherein a front end of said at least one linear guide key projects forward from said at least one linear guide groove when said movable frame is positioned at said rear movement limit thereof.

15. (Original) The drive mechanism according to claim 11, wherein said at least one linear guide groove comprises a plurality of linear guide grooves located at different circumferential positions, and

wherein said at least one linear guide key includes a plurality of linear guide keys located at different circumferential positions.

16. (Original) The drive mechanism according to claim 11, further comprising a stationary barrel,

wherein said linear guide and said cam ring are movable relative to said stationary barrel in said optical axis direction.

17. (Original) The drive mechanism according to claim 11, wherein said lens barrel comprises a plurality of movable lens groups movable relative to each other in said optical axis direction, said movable frame supporting at least one of said plurality of movable lens groups.

18. (Original) A drive mechanism of a lens barrel, comprising:

a cam ring including a plurality of cam grooves located on an inner peripheral surface of said cam ring at different positions thereon in at least an optical axis direction, and a

circumferential groove formed in the vicinity of a rear end of said cam ring, wherein said plurality of cam grooves are configured to respectively trace a plurality of reference cam diagrams having generally the same shape and size, and wherein a rearmost cam groove of plurality of cam grooves in said optical axis direction is configured such that a rear portion of said rearmost cam groove is missing and forms at least one rear end opening of said rearmost cam groove at said rear end of said cam ring;

a movable frame including a plurality of cam followers located at different positions in at least said optical axis direction and are respectively engageable in said plurality of cam grooves, and at least one linear guide groove located on an outer peripheral surface of said movable frame to extend generally parallel to said optical axis, each of opposite ends of said linear guide groove being open; and

a linear guide including a ring portion, at least one linear guide key and at least one cam follower passage recess, wherein said ring portion is engageable in said circumferential groove so as not to move in said optical axis direction relative to said cam ring and be rotatable relative to said cam ring, and said ring portion including a central opening through which said movable frame can pass, wherein said at least one linear guide key projects forward from said ring portion along an inner peripheral surface of said cam ring and is positioned radially inside said central opening and is further slidably engageable in said at least one linear guide groove, and wherein said at least one cam follower passage recess is located on an inner peripheral surface of said ring portion, said at least one cam follower passage recess generally aligned with said rear end opening of said rearmost cam groove in said optical axis direction to allow said plurality of cam followers to pass said ring portion through said at least one cam follower passage recess in said

optical axis direction when said cam ring and said linear guide are positioned relative to each other such that a rearmost cam follower of said plurality of cam followers reaches said rear end opening of said rearmost cam groove,

wherein the entire said movable frame is positioned in front of said ring portion when said movable frame is positioned at a front movement limit thereof, and

wherein at least part of said movable frame passes through said central opening of said ring portion such that said rearmost cam follower is disengaged from said rearmost cam groove through said rear end opening and said at least one cam follower passage recess when said movable frame moves to a rear movement limit thereof from said front movement limit.

19. (Original) The drive mechanism according to claim 18, wherein a rear end of said at least one linear guide key projects rearward from said at least one linear guide groove when said movable frame is positioned at said front movement limit thereof, and

wherein a front end of said at least one linear guide key projects forward from said at least one linear guide groove when said movable frame is positioned at said rear movement limit thereof.

20. (Original) The drive mechanism according to claim 18, wherein said at least one linear guide groove comprises a plurality of linear guide grooves located at different circumferential positions, and

wherein said at least one linear guide key comprises a plurality of linear guide keys located at different circumferential positions.

21. (Original) The drive mechanism according to claim 18, further comprising a stationary barrel,

wherein said linear guide and said cam ring are movable relative to said stationary barrel in said optical axis direction.

22. (Original) The drive mechanism according to claim 18, wherein said lens barrel comprises a plurality of movable lens groups movable relative to each other in said optical axis direction, said movable frame supporting at least one of said plurality of movable lens groups.

23. (Original) The drive mechanism according to claim 11, wherein the distance between said front movement limit and said rear movement limit of said movable frame is a greater than an axial length of said at least one linear guide key.

24. (New) A digital camera having a body and a lens barrel housed within the body, said lens barrel comprising a guide mechanism, the guide mechanism comprising:

a support frame supporting an imaging component; and

a linear guide configured to guide the support frame along an axis;

wherein the linear guide comprises a ring portion defining an opening through which the support frame can pass, and further comprises at least one linear guide key extending along the axis from the ring portion and positioned substantially radially inwardly of the opening; and

wherein the support frame has at least one linear guide groove located at the outer peripheral surface thereof and configured to slidably engage with a respective said at least one linear guide key, and each of the opposite ends of the at least one linear guide groove are open such that the support frame is movable to extend from either of the sides of the ring portion.

25. (New) The camera according to claim 24, wherein said at least one linear guide key extends along the axis on one side of the ring portion only.

26. (New) The camera according to claim 24, wherein said at least one linear guide key extends generally perpendicularly from the ring portion.

27. (New) The camera according to claim 24, wherein the linear guide has a plurality of linear guide keys provided at different circumferential positions of the ring portion, and wherein the support frame has a corresponding plurality of linear guide grooves.

28. (New) The camera according to claim 24, wherein the linear guide key is substantially planar and is provided substantially perpendicular to a radius of said ring portion.

29. (New) The camera according to claim 24, wherein the ring portion has at least one guide projection projecting radially outwardly therefrom and configured to engage a linear guide ring.

30. (New) The camera according to claim 29, further comprising a linear guide ring having at least one guide portion, formed on an inner peripheral surface thereof, engageable with said guide projection and configured to guide the linear guide along said axis without rotating.

31. (New) The camera according to claim 24, further comprising a cam ring rotatable about said axis, the cam ring having at least one cam groove located on an inner peripheral surface thereof;

wherein the support frame includes at least one cam follower which projects from an outer peripheral surface thereof engageable with said cam groove.

32. (New) The camera according to claim 31, wherein said cam ring has a plurality of cam grooves located at different positions on said inner peripheral surface thereof in at least said axis direction to respectively trace a plurality of reference cam diagrams having generally the same shape and size, respectively;

wherein a rearmost cam groove of said plurality of cam grooves in said axis direction is located such that a rear portion of said rearmost cam groove is missing and forms at least one rear end opening of said rearmost cam groove at said rear end of said cam ring;

wherein said support frame has a plurality of cam followers which are located at different positions on said outer peripheral surface thereof in at least said axis direction, said plurality of cam followers respectively engageable in said plurality of cam grooves;

wherein a rearmost cam follower of said plurality of cam followers is movable out of said rear end opening to be disengaged from said rearmost cam groove when said support frame is positioned at a rear movement limit thereof; and

wherein said ring portion includes at least one cam follower passage recess, which is formed on an inner peripheral surface thereof, and allows said plurality of cam followers to pass through said cam follower passage recess in said axis direction, when said plurality of cam followers are disengaged from said rearmost cam groove.

33. (New) The camera according to claim 31, wherein the ring portion is supported by a circumferential portion of said cam ring such that the cam ring is rotatable relative to said ring portion and immovable relative to said ring portion in said axis direction.